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The sun is now on the point of retiring for the night, although it is barely three o'clock, and the sight of the tall caches, like corncribs, which mark the position of the village for which we are bound, is not unwelcome; for thirty miles on snowshoes is a good day's tramp, especially for the first time. In a few minutes we are seated in one of the comfortable underground houses and enjoying the hospitality of the friendly Eskimo. Perhaps some summer's day, reader, we will try our luck together again.

A FEW WORDS ABOUT MOTHS.

BY A. S. PACKARD, JR.

THE opportunity of copying a number of colored figures by Abbot, hitherto unpublished, leads me to say a few words regarding our native moths. The Lepidoptera, both butterflies and moths (especially the former, from their constant presence by day) from their beauty and grace, have always been the favorites among amateur entomologists, and the rarest and most costly works have been published in which their forms and gorgeous colors are represented in the best style of natural history art. We need only mention the folio volume of Madam Merian of the last century, Harris's Aurelian, the works of Cramer, Stoll, Drury, Hübner, Horsfield, Doubleday and Westwood, and several others, as comprising the most luxurious and costly entomological works.

Near the close of the last century, John Abbot went from London and spent several years in Georgia, rearing the larger and more showy butterflies and moths, and painting them in the larva, chrysalis and adult, or imago, stage. These drawings he sent to London to be sold. Many of them were collected by Sir James Edward Smith, and published under the title of "The Natural History of the Rarer Lepidopterous Insects of Georgia, collected from the Observations of John Abbot, with the Plants on which they Feed." London, 1797. 2 vols., fol. Besides these two rare volumes there are sixteen folio volumes of drawings by Abbot in the Library of the British Museum. The plate given with this article is selected from a thick folio volume of similar drawings presented by Dr. J. E. Gray of the British Museum to Professor Asa Gray, to whose kindness we are indebted for an opportunity of figuring the transformations before unknown of over a dozen moths, whose names are given, as far as possible in the present state of our knowledge, in the explanation of the plate.

The study of insects possesses most of its interest when we observe their habits and transformations. Caterpillars are always to be found, and with a little practice are easy to raise, and we would advise any one desirous of beginning the study of insects to take up the butterflies and moths. They are perhaps easier to study than any other group of insects, and are more ornamental in the cabinet. As a scientific study we would recommend it to ladies as next to botany in interest and the ease in which specimens may be collected and examined. The example of Madam Merian, and several ladies in this country who have greatly aided science by their well filled cabinets, and thorough and critical knowledge of the various species and their transformations, is an earnest of what may be expected from their followers. Though the moths are easy to study compared with the bees, flies, beetles and bugs, and neuroptera, yet many questions of great interest in philosophical entomology have been answered by our knowledge of their structure and mode of growth. The great works of Herold on the evolution of a caterpillar; of Lyonet on the anatomy of the Cossus; of Newport on that of the Sphinx, both in their various stages; and of Siebold on the parthenogenesis of insects, especially of *Psyche helix*, are proofs that the moths have engaged some of the master minds in science.

The study of the transformations of the moths is also of great importance to one who would acquaint himself with the questions concerning the growth and metamorphosis and origin of animals. We should remember that the very words "metamorphosis" and "transformation," now so generally applied to other groups of animals and used in philosophical botany, were first suggested by those who observed that the moth and butterfly attain their maturity only by passing through wonderful changes of form and modes of life.

The knowledge of the fact that all animals pass through some sort of a metamorphosis is very recent in physiology. Moreover the fact that these morphological eras in the life of an individual animal accord most unerringly with the gradation of forms in the type of which it is a member, was the discovery of the eminent physiologist Von Baer. Up to this time the true significance of the luxuriance and diversity of larval forms had never seriously engaged the attention of systematists in entomology.

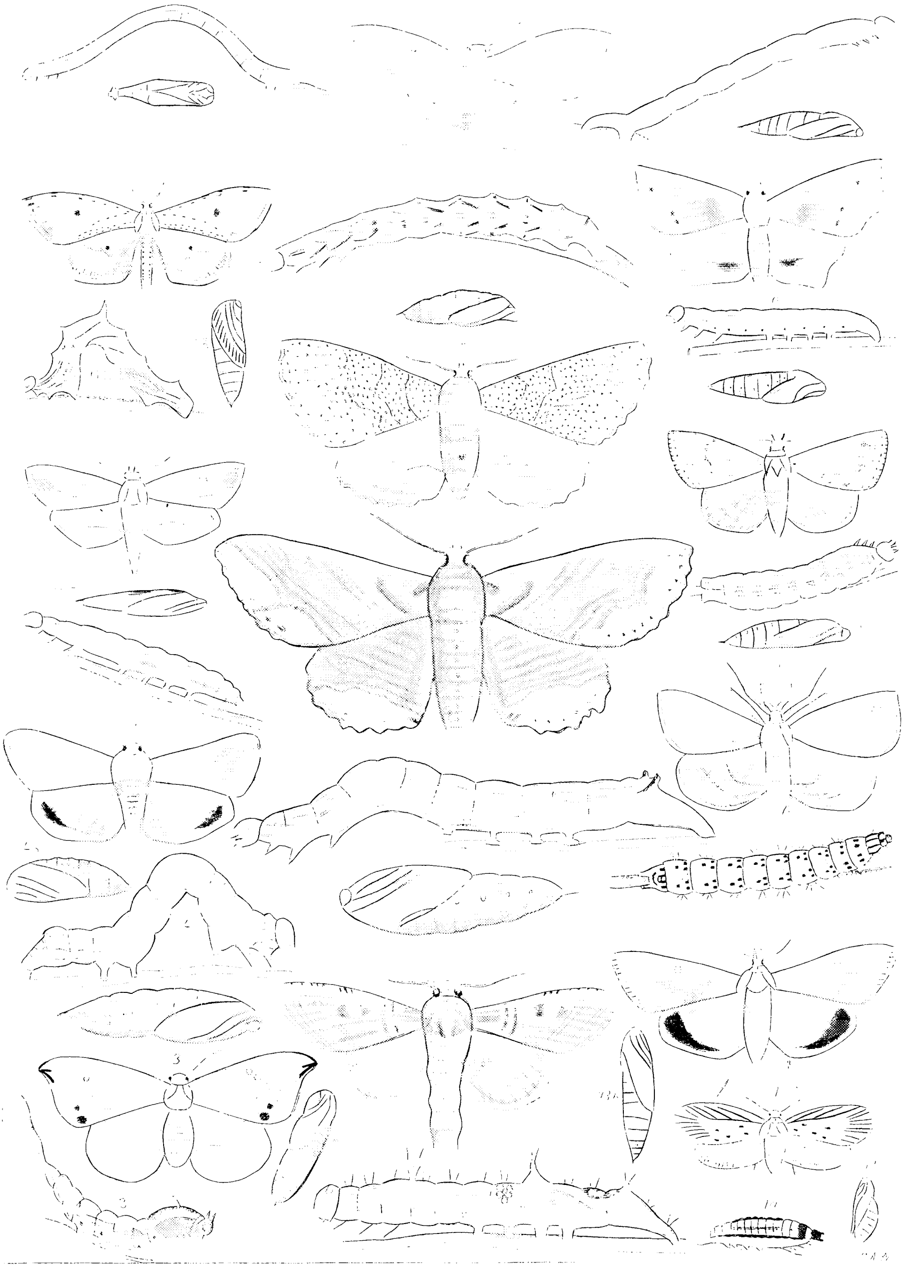
What can possibly be the meaning of all this putting on and taking off of caterpillar habilaments, or in other words, the process of moulting, with the frequent changes in ornamentation, and the seeming fastidiousness and queer fancies and strange conceits of these young and giddy insects seem hidden and mysterious to human observation. Indeed, few care to spend the time and trouble necessary to observe the insect through its transformations; and that done, if only the larva of the perfect insect can be identified and its form sketched how much was gained! A truthful and circumstantial biography in all its relations of a single insect has yet to be written.

We should also apply our knowledge of the larval forms of insects to the details of their classification into families and genera, constantly collating our knowledge of the early stages with the structural relations that accompany them in the perfect state.

The simple form of the caterpillar seems to be a concentration of the characters of the perfect insect, and presents easy characters by which to distinguish the minor groups; and the relative rank of the higher divisions will only be definitely settled when their forms and methods of transformation are thoroughly known. Thus, for example, in two groups of the large Attacus-like moths, which are so amply illustrated in Dr. Harris's "Treatise on Insects Injurious to Vegetation;" if we take the different forms of the caterpillars of the Tȧu moth of Europe, which are figured by Godart and Duponchel, we find that the very young larva has four horn-like processes on the front, and four on the back part of the body. The full grown larva of the Regalis moth, of the Southern states, is very similarly ornamented. It is an embryonic form, and therefore inferior in rank to the Tau moth. Multiply these horns over the surface of the body, lessen their size, and crown them with hairs, and we have our Io moth, so destructive to corn. Now take off the hairs, elongating and thinning out the tubercles, and make up the loss by the increased size of the worm, and we have the caterpillar of our common Cecropia moth. Again, remove the naked tubercles almost wholly, smooth off the surface of the body, and contract its length, thus giving a greater convexity and angularity to the rings, and we have before us the larva of the stately Luna moth that tops this royal family. Here are certain criteria for placing these insects before our minds in the order that nature has placed them. We have here certain facts for determining which of these three insects is highest and which lowest in the scale, when we see the larva of the Luna moth throwing off successively the Io and Cecropia forms to take on its own higher features. So that there is a meaning in all this shifting of insect toggery.

This is but an example of the many ways in which both pleasure and mental profit may be realized from the thoughtful study of caterpillar life.

In collecting butterflies and moths for cabinet specimens, one needs a gauze net a foot and half deep, with the wire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frame a foot in diameter; a bottle containing a parcel of cyanide of potassium gummed on the side, in which to kill the moths, which should at once be pinned in a cork-lined collecting box carried in the coat pocket. The captures should be spread and dried on a grooved setting board, and a cabinet formed of cork-lined boxes or drawers; or as a substitute for cork, frames with paper tightly stretched over them may be used, or corn, or palm-pith. Caterpillars should be preserved in spirits, or glycerine with a little spirits, or strong salt and water, while some ingeniously empty the skins and inflate them over a flame so that they may be pinned by the side of the adult.

EXPLANATION OF PLATE 2.

Fig. 1. *Eustixis pupula* Hübner, female; 1*a*, larva, 1*b*, pupa. Feeds on *Sideronytum tenax.*

Fig. 2. *Cœlodasys biguttatus* Pack., male; 2*a*, larva; 3*a*, pupa. Feeds on *Ipomea coccinea.*

Fig. 3. *Dryopteris,* probably undescribed, female; 3*a*, larva; 3*b*, pupa. Feeds on *Viburnum nudum.*

Fig. 4. *Acontia metallica* Grote, male; 4*a*, larva; 4*b*, pupa. Feeds on *Hibiscus palustris.*

Fig. 5. *Homoptera edusa* (Drury). 5*a*, larva; 5*b*, pupa. The plant on which it feeds is not named.

Fig. 6. *Hyperetis,* species not known, female; 6*a*, larva; 6*b*, pupa. Feeds on a species of *Azalea.*

Fig. 7. *Boarmia,* species not known, female; 7*b*, larva; 7*a*, pupa. Feeds on *Helenium.*

Fig. 8. *Acidalia,* species unknown. 8*a*, larva; 8*b*, pupa. Feeds on *Trillium.*

Fig. 9. *Herminia,* species not identified, male; 9*a*, larva; 9*b*, pupa. Feeds on *Rhexia mariana.*

Fig. 10. *Helia æmulalis* (Hübner)? female; 10*a*, larva; 10*b*, pupa. Feeds on *Phlox speciosa.*

Fig. 11. An unknown species of *Phalænidæ,* male; 11*a*, larva; 11*b*, pupa. Feeds on *Coreopsis.*

Fig. 12. A species of *Botys,* male; 12*a*, larva; 12*b*, pupa. Feeds on *Ipomea.*

Fig. 13. A species of *Botys,* female; 13*a*, larva; 13*b*, pupa. Feeds on a species of *Crotalaria.*